IRM STRATEGIC PLAN 2001-2005

CENTERS FOR DISEASE CONTROL AND PREVENTION and AGENCY FOR TOXIC SUBSTANCES AND DISEASE REGISTRY

EXECUTIVE SUMMARY

Information technology (IT) can transform how an organization achieves its mission. Moreover, it can enable radical and fundamental change in business processes. The management of data, information, knowledge, and processes has become the focus of IT. The challenge is to identify, procure, and deploy IT resources to meet organizational goals in highly effective and efficient ways.

CDC's mission of promoting health and quality of life by preventing and controlling disease, injury, and disability continues to be increasingly dependent on IT, electronic communications, and digital media. Detecting health events and assessing health status trends in populations in a timely, comprehensive, reliable, and cost-effective manner is only possible through IT.

Health care in this country is undergoing radical change as a result of new health delivery technologies, diagnostics, pharmaceuticals, remote telemedicine, and most of all -- health care reform through managed care. Public health is also being reinvented with new challenges and opportunities in the core functions of assessment, policy development, and assurance of health services and protection of health for all.

There are a number of driving factors affecting CDC's public health mission of preventing disease, disability, and injury; such as newly emerging diseases, health care reform, and new legislation. There are also a number of global trends that provide opportunities for CDC to better achieve its goals through information technology, such as health care and public health investments in IT and information systems, the development of electronic medical records, the growing ubiquity of electronic connectivity, networking and the Internet, and the convergence of communications media.

CDC is positioned to provide a leadership role in developing a national public health and prevention research information infrastructure to promote the health and well-being of the public, facilitate public health decisions, take appropriate public health actions, and provide relevant information to individuals to make health-related choices. Information resources management and information technology will play catalytic and enabling roles in achieving these goals.

INTRODUCTION

This document represents the Information Resources Management (IRM) Strategic Plan of the Centers for Disease Control and Prevention (CDC), including the Agency for Toxic Substances and Disease Registry (ATSDR). Further references to CDC in this plan include ATSDR. This Strategic Plan was developed through enterprise planning. It is the synthesis of the participation of the Principal IRM Officials and public health professionals from each of CDC's 20 major organizational components.

DRIVERS

Significant forces and trends in the public and private sector business setting as well as legal, fiscal, technological, and human resource environments continually reshape CDC's IRM Strategic plan .

Health Care Changes - The health care industry continues its radical change with widespread growth of managed care enterprises and changing relationships between health providers, insurers, and payers. This has and will continue to transform CDC's alliances and partnerships for monitoring health and achieving prevention goals.

New Legislation and Policy - The Clinger Cohen Act, Government Performance and Results Act, Health Insurance Portability and Accountability Act, telecommunications deregulation, Paperwork Reduction Act, Government Paperwork Elimination Act, OMB policies on managing federal information resources and capital planning, and other laws and policies are providing new requirements and opportunities for the role of information technology and systems in providing government services.

Human Resources - Tremendous demand for highly skilled IT professionals, the current and projected lack of supply, and the federal sector lack of pay comparability with the private sector is a growing challenge. In spite of significant outsourcing of services, CDC is challenged to retain and build upon internal core competencies for IT planning, project management, resource stewardship, and other inherent government functions.

Risks - Information security, cyber-terrorism, critical infrastructure protection, and continuity of government operations are major challenges for the federal government. Increasing investment and dependence upon electronic products and services as part of the digital government initiative increases the need for focus in these areas.

TRENDS

A number of global trends provide a framework for our strategic plan. They include:

Medical Care - Health care is the Nation's largest economic sector at $1.5 trillion annually. Medical care organizational investments in IT in general, telemedicine, electronic medical records (computerized patient records), improved home diagnostics, the $50 billion biotechnology industry and the several hundred biotechnology drugs on the market or in clinical trials, genetic engineering, computer automated laboratory tests, etc., are constantly changing medical care and consequently the role and practice of public health. Local public health is generally moving away from providing direct clinical services with the spread of managed care towards the core public health functions of health assessment, policy development, and assurance of health services and protection of health for all.

Information Infrastructure Investment - Information and information technology is the second largest economic sector of the U.S. at $800 billion annually and is the fastest growing. Private investment exceeds $50 billion per year in building new information highways to the home and business. The Internet infrastructure and information and commercial services on the Internet are rapidly expanding. The World Wide Web, in particular, has exploded and the entire IT marketplace has realigned its direction to focus on Web-related strategies. Moreover, corporations are either implementing or planning entire business ventures on the Web. Likewise, online information services continue to expand in provider numbers, users, content, and usage. The Administration and Congress are supporting the development of a next generation Internet (NGI) that would boost transmission capacity by 100-1,000 fold. Industry studies indicate that 60% of professionals' time is spent searching for information, seeking information from colleagues, reformatting it, or translating it from one system into another. This loss in productivity is fueling the knowledge management trend.

Business Alliances/Mergers - Multi-billion dollar mergers and alliances are occurring regularly between telecommunications, cable TV, publishing, and media companies.

Society - pervasive use of the Internet, rapid growth in subscriptions to online services, WebTV, telecommuting, and other societal patterns are leading towards virtual communities linked electronically.

STRATEGIC PLANNING ASSUMPTIONS

The following planning assumptions have guided this plan's development:

- Health care business changes are fundamentally altering public health's role in disease prevention, and health promotion and education. Consequently, CDC's mission and partnerships will continue to evolve and often dramatically change.

- Demand for access to information, protection of information and systems, and accountability of resources is growing. Electronic access to information and data by staff and the public is commonplace and demand continues to escalate.

- Continued uncertainty of agency staffing levels with cycles of growth and downsizing make planning for IT infrastructure and services more difficult. Continued difficulty in recruiting external IT professionals will likely be more acute especially in hot technology areas such as client-server, enterprise resource planning (ERP) implementations, Web-based systems, and Year 2000 work.

- IT spending as a proportion of CDC's overall funding (excluding grants) continues to increase with the growing importance of IT in the CDC's business processes. However, IT-specific funding initiatives may be difficult to obtain unless tied solidly to mission accomplishment.

GUIDING PRINCIPLES

The following guiding principles provide a continuing foundation for CDC's orientation and approaches to IRM and public health information:

Role of IT in the Mission

- CDC's IRM Strategic Plan must be closely aligned and integrated with CDC's vision, mission, and strategic plan for public health.
- Information technology and systems that provide reliable and accurate data/information are fundamental enablers for achievement of CDC's vision, mission, and goals.
- CDC's principal business is the collection, analysis, use, and stewardship of data and information to further public health.
- Data collected through public health surveillance and health information systems should be useful in the practice of public health at the local, state, and federal levels.
- CDC should play a leading role in the development of a national public health information infrastructure (NPHII) and prevention research information infrastructure (PRII), creatively using information technology for public health advances.
- An enterprise information technology architecture (ITA) is important to realizing the strategic plan, achieving integrated information systems and business processes, and making effective capital investment decisions.

Integrity

- CDC should be a leader in the definition of standards to preserve integrity, authenticity, accuracy, confidentiality, and accessibility of public health data and information.
- Public health agencies must have timely access via trusted and secure links to the data necessary to ensure the health and well-being of the public.

Partners

- Burdens should be minimized on providers of data to CDC.
- CDC should provide flexibility in the ways that it receives data from providers and disseminates information to users.

Processes

- Information technology provides a catalyst for change.
- Integration of data and interoperability of systems and adequate control over data creation, modification, use, transmission, and release when they are vital to the accomplishment of agency objectives.
- Data should be entered into an automated system only once and then integrated or electronically communicated thereafter.

CONTINUOUS ALIGNMENT WITH CDC's MISSION

The core challenge for CDC's IRM program is to continually align IT products and services with the organization's ever-changing mission needs and directions. IT is key to all of CDC's goals as demonstrated in the table as well as to the core functions of public health; i.e., assessment, policy development and assurance. Moreover, CDC's mission strategies are largely dependent upon information technology.

Since the mid 1980's, CDC has recognized that one of its primary products is:

high quality, timely public health information

Hence, the information life cycle described below is one of CDC's core business processes and IT plays the primary enabling role.

CDC's Information Life Cycle

Collect - Health determinant data is collected from many sources and avenues including scientific research, laboratory analysis, health surveys, vital statistics, disease surveillance, environmental data, socio-economic indicators, lifestyle behaviors, workplace conditions, public opinions, health insurance claims, health care encounters and events, census, and others.

Analyze - CDC adds value to raw health and related data by applying organizational and individual knowledge, creativity, innovation, analysis, and interpretation to transform it into information for public health action. CDC applies expertise in areas such as epidemiology, research, statistical analysis, and public health program and policy development. CDC's information products are used to improve the health of the nation's population through individual learning which facilitates more informed healthy choices; developing new public health initiatives and programs; developing new legislation, regulation or policy; and new standards or guidelines for health professionals in delivering health care and prevention.

Apply - CDC uses health information and knowledge to develop public health policy, programs, interventions, and disseminates information to an ever-growing audience of public health agencies, health care workers, private, public, voluntary, and non-profit organizations, Congress, state legislatures, the news media, and the public. This information is used for decision making, behavior modification, and taking other public health actions. Preserving individual privacy and pursuing mandated restrictions on use, increase in complexity as both audiences and modes of dissemination expand.

Linkage of IRM to CDC's Mission

	CDC Mission	CDC IRM Counterparts
Vision	Healthy People in a Healthy World -- Through Prevention	Healthy People in a Healthy World -- Through Information and Information Technology
Mission	To Promote Health and Quality of Life by Preventing and Controlling Disease, Injury, and Disability	To Support Achievement of the CDC Mission through Information and Information Technology
Goals	**Goal 1 -** Assure a Strong Science Base for Public Health Action	**Goal 1 -**Improve the Collection of Public Health Data **Goal 2 -** Enhance Analysis of Public Health Data **Goal 3 -** Improve Access and Sharing of Data, Information, and Knowledge
	Goal 2 - Detect and Assess Threats to Public Health	**Goal 1 -**Improve the Collection of Public Health Data **Goal 2 -** Enhance Analysis of Public Health Data

	Goal 3 - Provide Leadership for the Nation in Prevention Policy	**Goal 4** - Establish a Comprehensive Enterprise System for Linking Resource Planning, Deployment, and Tracking with Program Performance Measures
	Goal 4 - Assure the Public's Health Through Translation of Research into Action	**Goal 3** - Improve Access and Sharing of Data, Information, and Knowledge
	ALL Goals (cross-cutting)	**Goal 5** - Conduct Enterprise Business Process Modeling, Benchmarking, and Reengineering to Improve Effectiveness and Efficiency **Goal 6** - Improve Reliability, Availability, Performance, and Efficiency of the Information Technology Infrastructure **Goal 7** - Assure Protection of CDC's Information and Information Technology Assets

CROSS-CUTTING IRM STRATEGIES

In addressing the CDC IRM goals, the following common strategies have been identified:

- Continuously conduct IT research and evaluation to identify advantageous technologies;
- Employ standards-based approaches to maximize interoperability, e.g., open systems, client-server, Internet, electronic data interchange (EDI);
- Reduce integration complexity where possible to achieve program goals through an enterprise information technology architecture.
- Develop an IT human resources model suited to the accomplishment of diverse program objectives.
- Leverage the changing business and technology environments and involve customers and stakeholders in initiatives;
- Demonstrate and quantify the value of IRM to top leadership and management;
- Improve IRM decision-making process based on improved and broadly acceptable analyses;
- Assure commitment to continuous technology and security training of all staff;
- Continue development of CDC information technology, systems, and data management standards and guidelines; and
- Develop and continuously analyze the CDC inventory of information technology, system,

and data assets to identify areas for improved management, addressing existing gaps, reducing total cost of ownership, etc.

CDC's IRM GOALS

CDC's IRM goals and the performance measures associated with them are focused on alignment with CDC's mission goals. Goals and performance measures apply to the 5-year planning horizon.

CDC IRM GOALS	STRATEGIES	PERFORMANCE MEASURES
1. Improve the Collection of Public Health Data • reduce cycle time • reduce burden • broaden data sources • integrate data and systems Currently, the elapsed time from a health or vital (birth/death) event, its receipt at CDC, and the composite data being made available to researchers, public health professionals, or health practitioners ranges from months to years. ***The ultimate health monitoring goal is real-time detection of events with little or no human intervention.*** One recent example of improved data exchange and analysis was a 97% reduction in the time of outbreak cause determination from 20 years ago and a 77% reduction in time in the last 3 years alone.	1.1. Build a national public health data exchange architecture and infrastructure. 1.2. Develop standardized and secure data interchange over the Internet. 1.3. Develop advanced surveillance methods such as intelligent software agents to conduct public health surveillance. 1.4. Provide leadership with public health partners and national standards setting organizations in developing and implementing standardized data to facilitate electronic interchange, consolidation, management, and analysis. 1.5. Broaden partnerships and policy agreements for data exchange with health care and public health partners. 1.6. Integrate separate surveillance systems that use different client software and electronic communication methods.	a. Public health surveillance business processes (current and future) are modeled. A national information technology architecture is developed. All major public health surveillance data providers are networked and connected to the Internet. b. All data communications are standardized and are sent via the Internet with full encryption, authentication, and nonrepudiation for critical or sensitive data. c. Several pilot projects are testing technologies that make data available in real-time and eliminate human intervention. d. Implement or accommodate standardized core data elements in all CDC surveillance systems. All CDC developed surveillance software contains standardized data import/export capability. Develop and implement with the states and territories standard vital certificates and automated systems to collect, transmit, and analyze the vital statistics data. e. Increase breadth of public health data by 20% per year as measured by data available in national public health data repository. f. Develop an integrated surveillance and data communication framework on the

CDC IRM GOALS	STRATEGIES	PERFORMANCE MEASURES
2. Enhance Analysis of Public Health Data Improve the quality and capabilities of data analysis in support of scientific and prevention research and statistical and epidemiological analysis.	2.1. Establish a national prevention research data repository.	a. A Web accessible virtual and physical data repository is established containing 100GB of relevant public health data and which can support >1M queries per year.
	2.2. Develop Web-based analytic and display tools to mine and analyze data for epidemiologic analysis, query, and geographic mapping.	b. Increase the number of public health datasets that include geocoding.
	2.3. Research and develop advanced analysis tools and methodologies such as scientific visualization and automated pattern recognition.	c. CDC makes available a suite of Web-based data mining, analysis, and geographic information system display tools for use with the prevention research data repository. A research and development agenda is established and at least one project is funded.
	2.4. Increase ability to perform linked data file analyses.	d. Develop metadata dictionaries for the at least 20% of the data systems.

CDC IRM GOALS	STRATEGIES	PERFORMANCE MEASURES
3. Improve access and sharing of data, information, and knowledge. Make appropriate data and information resources universally available at the point, time, and in the needed format to support public health research, analysis, practice, prevention, policy development, and personal decision making consistent with security, privacy, and confidentiality obligations.	3.1. Provide a variety of standardized and integrated means for health practitioner and public access to CDC information resources.	a. Continually enhance CDC's Internet infrastructure so that accesses to CDC information resources grow 25% per year. Continue enhancing the CDC Voice/Fax information service (CDC VIS) such that usage grows 10% per year.
	3.2. Provide state grantee flexibility to use categorical health funding and provide technical assistance to support integrated health information systems development.	b. All the states are receiving any necessary guidance in using categorical health funding for integrated systems development and CDC is providing ongoing technical consultation/assistance.
	3.3. Provide leadership in creating the capability for public health data and information queries across local, state, and federal public health systems.	c. Data/information is seamlessly available and able to be queried across CDC and 25% of state health departments.
	3.4. Develop a virtual library in support of CDC scientific research.	d. CDC researchers have desktop access to >100GB of electronic scientific publications including full graphics and images. Intelligent software search agent technologies are used to discover and retrieve relevant Web-based information customized to the researcher.
	3.5. Initiate an effort in enterprise knowledge management.	e. A subject matter area knowledge system is in place. All agency policy, procedure and standards documents are on the Intranet by 2005. Increase corporate operations information available online to all staff on the Intranet by more than10% per year

CDC IRM GOALS	STRATEGIES	PERFORMANCE MEASURES
3. Cont.	3.6. Increase access for field staff, telecommuters, and other staff working away from the main CDC campuses.	f. All field staff and telecommuters have reliable, secure and sufficient speed access to CDC network, Internet, and Intranet resources.
4. Establish systems for linking resource planning, deployment, and tracking with program performance measures	4.1. Continue deployment and enhancement of CDC's integrated resource information system .	a. Establish a data warehouse containing all financial and resource information. Associate and track 50% of CDC's financial and human resources to projects through an automated system. Develop linkages to program performance measures as part of GPRA.
5. Conduct business process modeling, benchmarking, and reengineering to improve effectiveness and efficiency	5.1. Prioritize and address the following major functional areas: • acquisition management • document management • facilities management • financial management • grants management • materiel management • personnel management • information technology management • travel management 5.2 Increase web-enabled services to customers and constituents and allow flexible work methods by CDC staff.	a. Engage in these activities for 2 functional areas per year. Special emphasis is being placed currently on financial management, grants management, and human resources management. b. Provide a web-enabled grants application system to enable CDC's constituents to apply for grants via the web. c. Provide web-based administrative system transaction entry and query facilities to enable workstation-neutral administrative operations. d. Extend and optimize the use of industry standard EDI methods for supply chain automation.

CDC IRM GOALS	STRATEGIES	PERFORMANCE MEASURES
6. Improve reliability, availability, performance, and efficiency of the information technology infrastructure.	6.1. Develop an enterprise information technology architecture (ITA).	a. A comprehensive ITA is in place for the enterprise IT infrastructure including business process modeling, information flows, applications, data dictionary, technology and security standards.
	6.2. Develop and monitor service level agreements (SLAs) for all major enterprise IT services.	b. SLAs developed and tracked for: data center, desktop support, e-mail, Internet, networking, telecommunications, and user support as well as other functions.
	6.3. Benchmark enterprise IT services; identify and employ best practices.	c. One major functional area is benchmarked each year and recommendations implemented.
	6.4. Improve network management for performance, reliability, and increasing traffic loads.	d. Employ bandwidth, routing, and switching technologies to ensure communications traffic does not exceed 70% of available bandwidth for the daily peak hour of traffic.
	6.5. Lower total cost of ownership (TCO) for IT assets by upgrading to more cost-effective technologies, automated software distribution and desktop management, software reutilization, etc.	e. Reduce TCO of distributed computing by 25%. Improve data center performance and cost efficiency by 10% per year. A software reutilization library is created for software objects and components.

CDC IRM GOALS	STRATEGIES	PERFORMANCE MEASURES
7. Assure protection of CDC's information and information technology assets.	7.1. Assess and modify CDC systems to be Year 2000 capable. Also work with data providers to assure their compliance or ways of translating the data as necessary. 7.2. Implement the enterprise security plan and architecture developed from the information risk assessment. 7.3. Develop CDC standards for secure electronic data communi-cations across the Internet. 7.4. Build awareness of employees, contractor employees, supervisors, and managers of information security procedures and their obligations under the CDC "Standards of Care." 7.5. Enhance the information systems inventory.	a. All major and critical information systems are assessed, modified, tested, and made operational before the Year 2000. No system failures or erroneous system-induced results occur from Y2K non-compliance. b. No serious losses, alterations, or releases of critical or sensitive data/information occur. CDC's computer incident response capability (CIRC) responds within 1 hour of detected events. c. All systems transmitting sensitive data across the Internet use CDC standard secure methods. d. CDC employee Information Protection and Systems Security (IPASS) awareness and adherence to "Standards of Care" improves 50% as measured by survey. All positions are rated for their "public trust" risk and appropriate background checks will be current and appropriate. e. All information systems and data files are contained in the I/S portfolio inventory with specific system attribute data necessary for assessing security risks.

CAPITAL PLANNING AND INVESTMENT REVIEW

As required by ITMRA and OMB policy, CDC compiles and routinely reviews its portfolio of IT projects. CDC has a multistage process for IT project formulation and review involving a variety of stakeholders and oversight groups. The process is described by agency policy at: http://inside.cdc.gov/intranet/irmo/irmointra/itdocs.htm. Capital investment review criteria are consistent with OMB, GAO, and HHS guidance. Moreover, projects are reviewed for consistency with CDC's programmatic and IRM strategic plans, ITA, GPRA plan, and other considerations such as degree of systems integration for health and surveillance information systems and compliance with national health data standards.

Information Technology Architecture (ITA)

CDC has developed various components of an overall agency ITA, e.g. security infrastructure, certain public health data standards, enterprise networking, administrative process automation, general office automation, electronic communications and interoperability with state health agencies. Work is currently underway on the architecture for the agency's future infrastructure and system for national public health surveillance.

The ITA describes the relationships among the work the agency does, the information the agency uses, and the information technology that the agency needs. It includes standards that guide the design of new systems and ensures:

- alignment of the requirements for agency-sponsored information systems with the processes that support the agency's missions and goals;

- adequate interoperability, redundancy, and security of information systems; and, the application and maintenance of a collection of standards by which the agency evaluates and acquires new systems.

CDC Information Technology Architecture (ITA) Framework

ITA Component	Description
Business Functions	Process models of major mission and administrative work components
Information Flows and Relationships	How information flows through and between processes
Business Applications	Information systems that conduct or support the processes

Data Descriptions	Data models and data dictionary for the information systems
Technology Infrastructure	Hardware, software and communications components
Technical Standards	IT standards that determine IT directions and acquisitions
Security Model	Plans, procedures, and standards to ensure IT and system security, access control, integrity, confidentiality, reliability, authentication, non-repudiation, and recoverability.

APPENDIX 1 - Major IRM Initiatives

National Electronic Disease Surveillance System (NEDSS)

This system is focused on improving the core capacity of state and local health agencies' information technology and system capabilities, a need which state health officials have identified as one of the their highest priorities. In this effort, CDC will play a pivotal role in ensuring that the new generation of state information systems interoperate and intercommunicate data in a secure, reliable, and high integrity manner for national health monitoring, disease detection, and rapid response.

The long-term goal of NEDSS is to develop an electronic information system that automatically gathers health data from a myriad of sources on a real-time basis, monitors health of communities, performs on-going analysis of trends, detects emerging health problems, and provides information for setting public health policy.

CDC Core Financial Management System

Currently the CDC's Total Online Processing System (TOPS) is the agency's core financial accounting system. TOPS contains grantee, vendor and travel payment transactions for accounts payables, travel and payroll information, General Ledger activity, financial information and reports. However, this legacy system is written in COBOL and maintained through mainframe IDMS database that is becoming more difficult to support through high costs and resources.

The Financial Management Office's goal is to replace or significantly upgrade CDC's financial system with an enterprise wide business solution that will significantly improve CDC's current business operations. To accomplish this CDC must first establish a business case that will determine the financial and operational feasibility of the alternative actions that can be taken. Process redesign shall be considered essential to meet the agency's user needs for financial requirements. Re-engineering of the TOPS financial system will be considered with evaluation of commercial "off-the-shelf" software packages. However, the new financial systems must meet specific qualifications to be certified under the Joint Financial Improvement Management Program (JFMIP).

Enterprise Resource Planning (ERP) Systems

CDC has been operating a highly automated and integrated set of administrative applications called CDC/IS since the 1980's. These systems and the underlying infrastructure that provides workflow automation, directory services, authorizations, and security, have enabled highly effective and efficient transaction processing in many areas including finance, human resources, travel, procurement, etc. However, these systems are aging, are based on older mainframe technology, and cannot keep pace with the rapid business changes and information needs of CDC.

Efforts are underway to research, acquire and implement replacement systems with commercially available ERP-type systems.

APPENDIX 2 - I/S Security Accomplishments and Initiatives

CDC continues implementation of an action plan to substantially increase the agency's information security readiness in areas including: intrusion detection, policy monitoring, user authentication, data encryption, and event response. Work also continues in the areas of contingency planning, critical infrastructure protection, continuity of government operations, and disaster recovery testing.

CDC is completing its public key infrastructure (PKI) for the secure transmission of sensitive and/or critical public health data over the Internet with public health partners.